

ONE-CUT PAPER STARS

Duration: 1-5 Minutes

Institution: Science Museum of Minnesota

Skill level/Age Level: 2nd Grade - Adult

Group size: 1—individual but can be facilitated to a large group

INTRODUCTION

Take a full sheet of letter-sized paper and fold it. Then with just one snip of a scissors unfold that same piece of paper and you have a five-pointed star! We like this activity as it introduces the idea of using specific paper folds to create the silhouettes of almost any shape (polygon) with one cut of a pair of scissors. Harry Houdini, the famous magician; describe this “trick” in his 1922 book titled *Paper Magic*. There are also historical references to Betsy Ross who created the design of the United States flag with its unique 5-pointed stars.

KEY CONCEPTS AND/OR SUBJECT AREA

Origami mathematics is the study of the geometry of origami. The practical goal of this activity is to engage learners in the material exploration of geometry through origami and paper cutting.

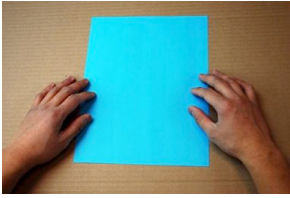
MATERIALS AND TOOLS



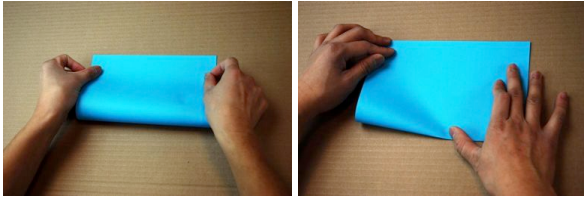
Essential Materials:

- 8 ½ x 11” Paper, colored. Folded uncut examples for facilitators
- Scissors (child safety)

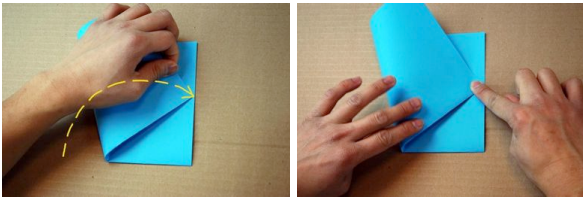


HOW TO OR STEP-BY-STEP

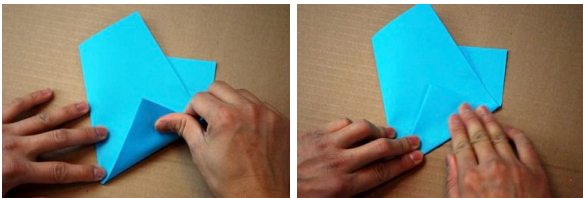
1. Lay out a sheet of paper in portrait orientation



2. Fold the paper in half—up away from yourself. Smooth the fold with your finger then your fingernail to create a sharp smooth crease (use this technique on all folds)



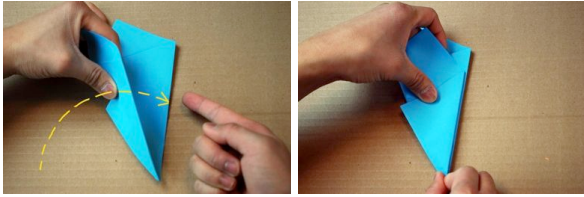
3. Fold left bottom corner up and over to the center of the right edge. Press and smooth the fold



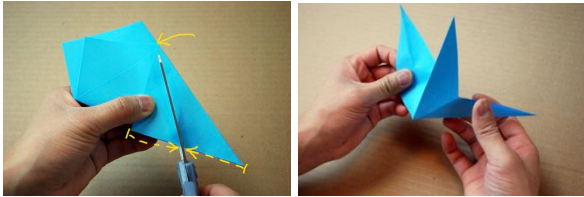
4. Next, fold bottom right corner up along the previous folded edge. Smooth out the fold



5. Flip your paper over then lift the left edge up



6. And fold it over and line it up with the right edge



7. Now you want to make your single cut. Following the image, start your cut in the middle of the bottom fold, then aim the scissors at the point where the arrow is indicating—where all the folds come together. Snip this piece off, and unfold



FACILITATION TIPS

What is a bit special about this activity is that the demonstration by the facilitator can be dramatic—making the folds, then snipping off the one piece it's fun to unfold the wrong parts which fall into a pile of pieces. The facilitator can feign surprise that it did not work, then “discover” the smaller piece and unfold it to become the star. This can be combined with talking about the neat history of Harryoudini and Betsy Ross and finally connecting it with math and algorithms.

PROMPTS AND QUESTIONS

- How many folds?
- Can you make a snowflake with paper? A five-sided one?
- What happens if you fold it “wrong”? What shapes do you get?

GENERAL FACILITATION TIPS

It's a simple, fast and interesting activity. We combine this with a large array of folding activities. We have instructions and examples of each in a box of folding

MORE INFORMATION*The Fold-and-Cut Problem*

A great website that presents an approach to origami mathematics through the creation of algorithms to create virtually any polygon with fold and a single cut of scissors.

<http://www.erikdemaine.org/foldcut/>

Betsy Ross Homepage Resources

“George Washington’s original pencil sketch for the flag indicated 6-pointed stars, a form he apparently preferred. Betsy Ross, however, recommended a 5-pointed star. When the committee protested that it was too difficult to make, she took a piece of paper, folded it deftly, and with a single snip of her scissors, produced a symmetrical five-pointed star. This seeming feat of magic so impressed her audience that they readily agreed to her suggestion.”

<http://ushistory.org/BETSY/flagstar.html>

KEYWORDS

- Origami mathematics
- Algorithm
- Geometry
- Folding